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THE OMSK-BOLOTNOYE SECTION OF THE TRANS-SIBERIAN RAILROAD USSR

[redacted]

CIA/RR-EIM-TI-58

17 JUNE 1958

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[redacted]

CENTRAL INTELLIGENCE AGENCY
OFFICE OF RESEARCH AND REPORTS

25X1

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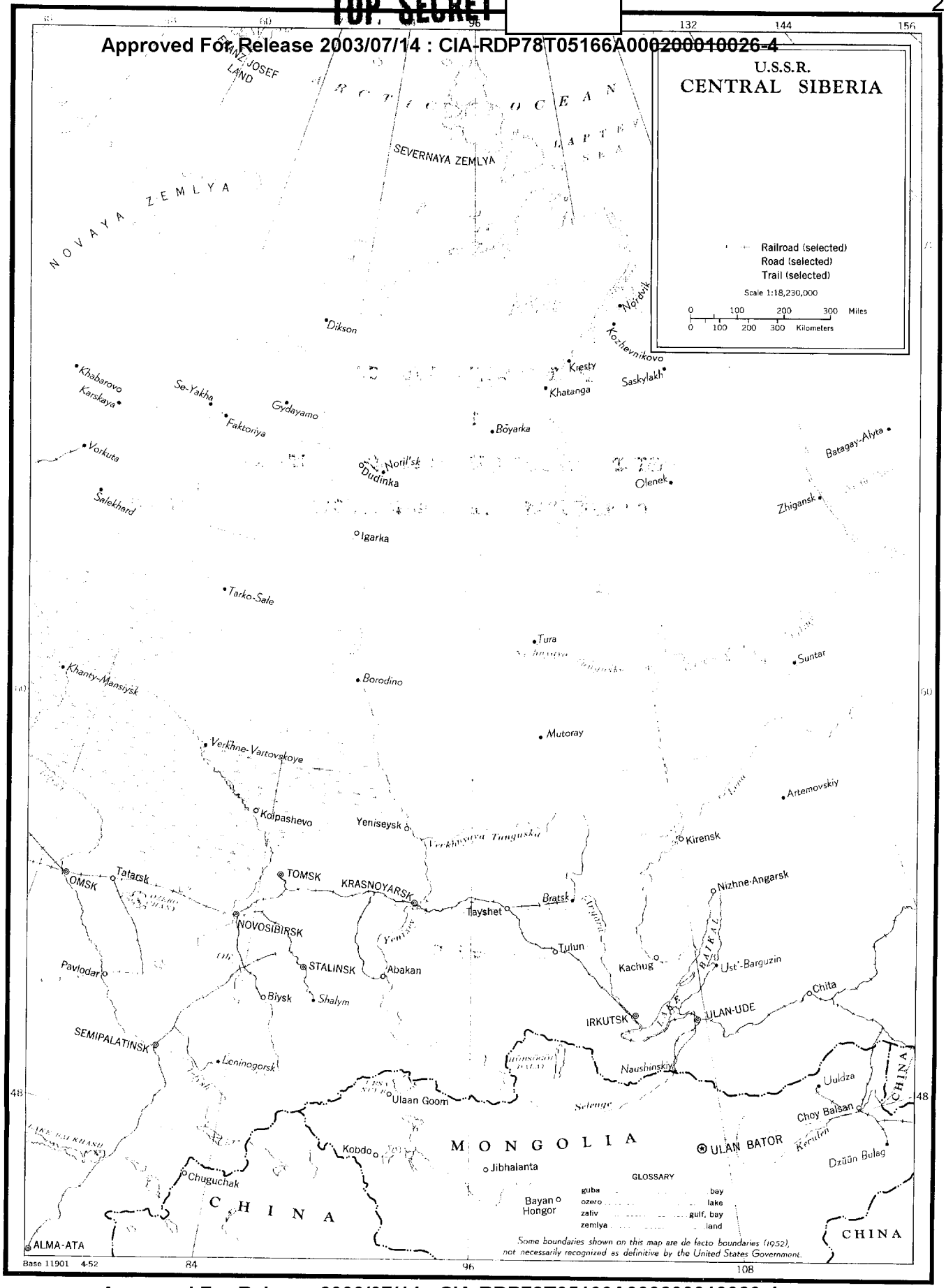
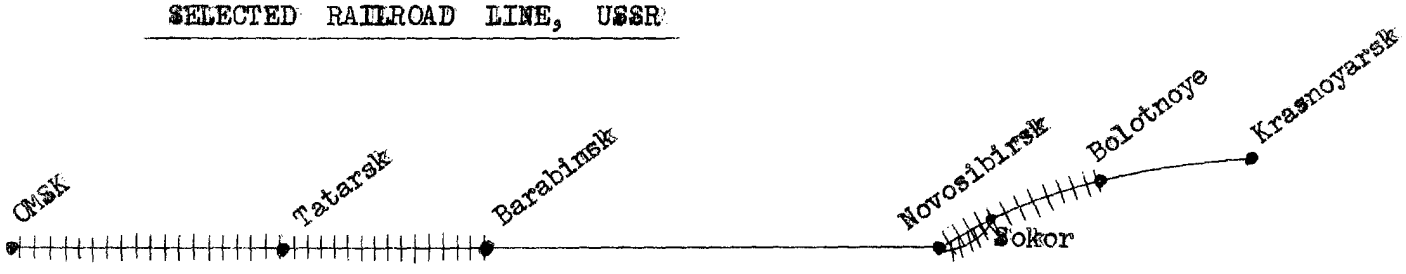
PHOTOGRAPHIC EVIDENCE
ON THE
CAPABILITY OF THE OMSK-BOLOTNOYE SECTION
OF THE TRANS-SIBERIAN RAILROAD
USSR

CIA/RR-EIM-T1-58

17 June 1958



SELECTED RAILROAD LINE, USSR



++++++++++++++ Sections of railroad line covered by interpreted photography

FOREWORD

The Transportation Capabilities Estimates Group (TCEG), an inter-agency working group operating under Department of Army auspices, has prepared estimates of the capability of the 6500 kilometer (4100 mile) Trans-Siberian Railroad extending between Omsk and Vladivostok in the USSR. A SECRET report (herein after referred to as the TCEG Report) containing these estimates was released by the Department of the Army on 28 February 1958.* The ORR member of the TCEG was unable to concur in the estimates contained in the TCEG Report, owing partly to conclusions reached from a preliminary examination of photography taken on [redacted] 25X1D

25X1D [redacted] of the 325 kilometer section of the Trans-Siberian Railroad between Omsk and Barabinsk and the 125 kilometer section between Novosibirsk and Bolotnoye.

The purpose of this report is to present an analysis of the photo interpretation reports based on the [redacted] photography, and to describe the effect of this analysis on the current intelligence estimates of the capability of the Trans-Siberian Railroad. Photographic evidence is compared with the information employed in appropriate sections of the TCEG Report, and the impact of the differences in basic information on the capability estimates is described. 25X1D

* Army ACSI, NRA-1051, 28 February 1958, Capability of the Trans-Siberian Railroad, S.

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PHOTOGRAPHIC EVIDENCE ON THE CAPABILITY OF THE OMSK-BOLOTNOYE SECTION OF THE TRANS-SIBERIAN RAILROAD, USSR

SUMMARY*

Analysis of the photo interpretation reports based on the [redacted] 25X1D photography covering 450 kilometers of the 6500 kilometer Trans-Siberian Railroad indicates train movement in excess of that revealed by other sources of intelligence. Moreover, the railroad yards and locomotive servicing and repair facilities that support train movement are shown in the photography to be larger than had been estimated from study of other intelligence sources.

Estimates based on the photography indicate train movements of a minimum of 70 trains each way per day on the 325 kilometer railroad line between Omsk and Barabinsk. (Figure 1)**. This estimated actual traffic performance is 55 percent greater than the total estimated maximum sustained capability of 45 trains each way per day contained in the TCEG Report. Analysis of the photography indicates that these trains could have moved a minimum of 156,800 tons*** each way per day. This tonnage estimate is 67 percent greater than the one contained in the TCEG Report, 23 percent greater than traffic announced by the USSR for 1955, 13 percent greater than traffic announced for 1956 and 4 percent greater than that indicated by the train count of an attache on a

* The estimates and conclusions contained in this report represent the best judgment of ORR as of [redacted] 25X1D

** Inside front cover.

*** Metric tons are used throughout this report.

portion of this line on

Estimates based on the photography of the 125 kilometer Novosibirsk-Bolotnoye railroad line indicate a train movement of 38 to 68 trains each way per day - 71,440 to 127,840 tons. This traffic is 11 to 100 percent greater than the train movement estimate contained in the TCEG Report and 88 to 236 percent greater than the tonnage movement contained in that report.

The inventory of tracks in railroad yards at Omsk, Tatarsk, Barabinsk and Novosibirsk discernible from the photography is so great that it is possible to estimate that one and a half to three and a half times more trains can be handled than the number contained in the TCEG Report even when the rather low yard utilization factors contained in that report are applied to this inventory of tracks. Moreover, analysis of the photography of locomotive servicing and repair facilities at these same stations reveals two to five times the number of repair spaces for locomotives contained in the TCEG Report.

It is significant that even though the traffic indicated by the photography is of high density, the freight car occupancy of the yards is relatively low in terms of the maximum normally considered possible for efficient operation, and storage tracks for repair shops are virtually empty, indicating excess capacity in these traffic supporting facilities. It appears, therefore, that the maximum sustained capability of the Omsk-Novosibirsk and Novosibirsk-Bolotnoye railroad lines must be significantly in excess of the traffic in terms of trains and tonnage per day

estimated from the photography which in turn is substantially higher than the maximum capability estimate of the TCEG Report. The great discrepancy which has been found in comparing the estimate from the photography with the estimate in the TCEG Report casts further doubt on the validity of the estimate for the through capability of the whole of the Trans-Siberian Railroad (Omsk-Vladivostok) contained in the TCEG Report. This estimate is 27,000 tons each way per day, or the equivalent of only about 12 trains of the type observed to be in operation between Omsk and Barabinsk.

I. Introduction

The preparation of an estimate of the capability of a railroad system is a complex problem and authorities are not agreed on the best method for achieving this purpose. Nevertheless, all students of the problem agree that if an adequate amount of motive power and rolling stock is available for operation over a specific line of a system there are three principal components of the railroad plant that limit the amount of freight traffic that can be moved. These components are: (a) the nature and quality of the railroad lines; (b) the nature, quality and size of freight yards, and (c) the nature, quality and size of locomotive servicing and repair facilities. The weakest of these three components limits the capability in terms of train movement and tonnage for a particular railroad line.

The Transportation Capabilities Estimates Group (TCEG) in its study of the Trans-Siberian Railroad between Omsk and Vladivostok examined each of these components in terms of the information available to it. Much of the information was admittedly old and incomplete.

Although photographic intelligence reports are available on only 450 kilometers of the 6,500 kilometer Trans-Siberian Railroad, the evidence in these reports is of such great reliability and differs so dramatically from that which previously existed on the size of the railroad operation and plant, that it is considered worthy of presentation in this special report.

II. Evidence on Capability*

A. General

Photographic Intelligence Memoranda pertinent to the capability of the Trans-Siberian Railroad have been prepared thus far as follows: HTA-M52/57, "Rail Traffic on the Omsk/Barabinsk Section of the Trans-Siberian Railroad"; SPIR-49/57, "The Trans-Siberian Railroad between Omsk and Barabinsk"; HTA-M46/57, "Railroad Yards and Shops Omsk, USSR"; HTA-M44/57, "Railroad Station Yards and Shops Tatarsk, USSR"; HTA-M45/57, "Railroad Yards and Shops Barabinsk, USSR"; HTA/JM1/58, "Railroad Yards and Shops Novosibirsk, USSR"; and HTA-M59/57, "Rail Traffic on the Novosibirsk/Bolotnoye Section of the Trans-Siberian Railroad". These reports provide detailed descriptions of the movement of traffic and railroad plant between Omsk and Barabinsk. The railroad plant at Novosibirsk and the traffic on the railroad from Novosibirsk to Bolotnoye are also covered. Photo Interpretation reports on facilities along the line between Novosibirsk and Bolotnoye are not available. The evidence on rail traffic shows train movement in excess of that revealed by other sources, but in the magnitude announced by the USSR for 1955 and 1956. The railroad yards and locomotive servicing and repair facilities are larger than had been estimated from study of other sources of intelligence.

B. Line Capability

1. Omsk-Barabinsk (325 kilometers)

This double-tracked electrified line traverses flat

* Unless specifically cited to other sources, all data contained in this section are from the photo interpretation reports listed in II, A. "General".

terrain and therefore has few curves and very little grade. Transit sidings between Omsk and Valerino (94 kilometers from Omsk) occur every 11 to 16 kilometers. Between Valerino and Barabinsk they occur every 19 to 30 kilometers. The minimum headway between moving trains is 3 kilometers, indicating rather short blocks and the use of automatic block signalling. Speed of freight trains observed in the photography has been estimated as high as 57 kilometers per hour. The average speed of all eastbound freight trains was 33 kilometers per hour and of all westbound freight trains 26 kilometers per hour.

A total of 38 trains (34 freight trains and 4 passenger trains) were observed moving eastbound and 34 trains (30 freight trains and 4 passenger trains) were observed moving westbound. The average freight train moving eastbound was [redacted] 25X1D in length and contained 56 cars per train. The average westbound freight train was [redacted] 25X1D in length and contained 57 cars per train.*

Two methods were used in order to obtain some concept of the total number of trains moving in a 24 hour day over this section of the line. The first method was the [redacted] 25X1A [redacted] 25X1A** Applying this formula to the count and speeds

* The length and number of cars in a train is determined by the weight of commodities hauled, the number of empty cars to be transported, the size of cars, etc.

** [redacted] 25X1C

25X1

of freight trains observed in the photography, an estimate of 80 trains eastbound and 60 trains westbound is obtained, or a total of 140 trains per 24 hours.* The other method used consisted of determining how long it would take the average train to traverse the distance based on the computed average speed per freight train per hour. This method produced an estimate of 84 trains per day moving eastbound and 59 trains per day moving westbound for a total of 143 trains per 24 hours.**

25X1A

25X1

Thus, at the time the photography was obtained it appears that actual freight traffic between Omsk and Barabinsk amounted to at least 140 trains per day which over a period of time would balance out at an average of approximately 70 trains each way per day in order to provide for the movement of traffic and return of empty cars in each direction. In addition seventeen passenger trains were scheduled each way per day over this portion of the Trans-Siberian Railroad at the time the photography was obtained. 1/*

If each freight car is conservatively assumed to be capable of carrying at least 40 tons, the average trains (56 freight cars) would carry about 2,240 tons. The minimum traffic capacity of these 70 trains would therefore be about 156,800 tons each way per day.

2. Novosibirsk-Bolotnoye (125 kilometers)

This line is the double-tracked steam operated main line extending 125 kilometers from Novosibirsk east to Bolotnoye. A double-tracked steam operated freight by-pass around Novosibirsk connects with the main line at Sokur, 35 kilometers east of Novosibirsk. At the time of the photography, the minimum spacing between moving trains was four kilometers but the average density on this line was much less than on the Omsk-Barabinsk line.

A total of 20 trains were observed eastbound, 16 freights and 2 passengers on the main line and 2 freights on the by-pass. On the main line 1 passenger train was in motion eastbound and one was halted 81 kilometers east of Novosibirsk. Five freight trains were

* For serially numbered source references, see Appendix A.

in motion (average speed 34.5 kilometers per hour), 11 were halted on the main line or sidings of the main line. On the by-pass, one eastbound freight was in motion (42 kilometers per hour), and one freight was halted prior to entering the main line. A total of 13 trains were observed westbound; nine freights and two locomotives (travelling alone) were on the main line and two freights were on the by-pass. On the main line the two locomotives, balancing power, were moving at an average speed of 60 kilometers per hour. Seven freights were in motion (average speed 27 kilometers per hour), and two were halted on sidings. On the by-pass one freight was in motion (13 kilometers per hour) and one was halted on a siding one kilometer from Novosibirsk. The average freight train eastbound contained 50 cars. Westbound, the average train contained 42 cars.

Because of the unusual pattern in the eastbound movement of freight trains (11 trains were halted at the time the photography was obtained) the average speed per train was extremely low - 11.7 kilometers per hour. This unusual train pattern may have been created by the farthest east passenger train which was halted at Oyash, 44 kilometers west of Bolotnoye. This train was 30 minutes late according to the published timetable.[2/] The westbound movement appeared more normal, but even in this case there were sufficient trains halted or moving at slow speeds to produce a rather low average speed - 19.6 kilometers per hour.

Nevertheless, applying the [redacted] as described above, a movement of 40 trains eastbound and 36 trains westbound is obtained - a total of 76 trains per day. Identical estimates are obtained by applying the second method for obtaining an estimate of

25X1A

daily train density, described above.

If it can be assumed that the train movement situation observed in the photography is unusual and that the train movement would average 25 kilometers per hour (the average speed announced for all freight trains in the USSR during 1956 [3/]) a much higher train density can be obtained. Substituting 25 kilometers per hour for the 11.7 kilometer per hour eastbound and 19.6 kilometer per hour westbound in the [redacted] train densities of 84 trains eastbound and 52 trains westbound are obtained for a total of 136 trains per 24 hours. It would therefore appear that the train density on the line between Novosibirsk and Bolotnoye based on observations from the photography would be in the range of 76 to 136 trains per day or 38 to 68 trains each way per day. Assuming an average of 40 net metric tons per car, the weighted average train (47 cars) would carry about 1,880 metric tons. The traffic movement could then be between 71,440 and 127,840 tons each way per day.

25X1A

C. Railroad Yards

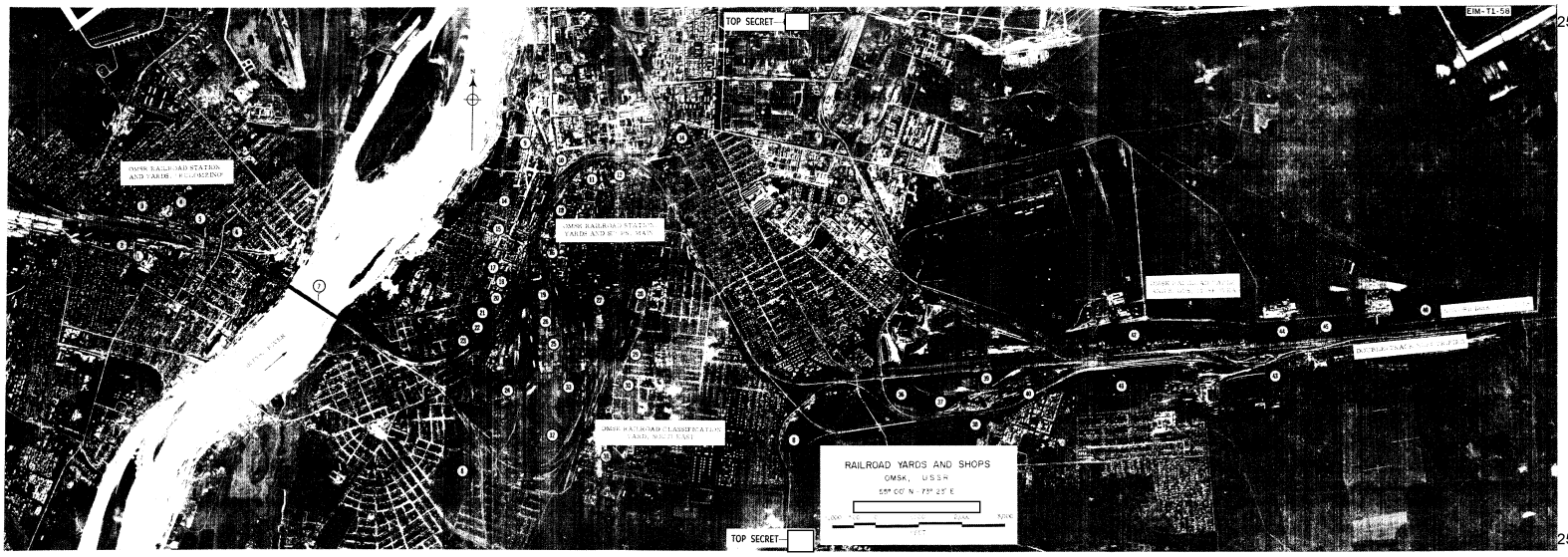
1. Omsk

The Omsk railroad yards are a major terminal and are regarded as the western terminus of the Trans-Siberian Railroad. (Figure 2)*. From this point the Trans-Siberian Railroad extends east to Vladivostok and the main line at Omsk breaks into two prongs of a fork for the westward movement of traffic. The southern prong extends westward to Petropavlovsk, Kurgan and Chelyabinsk. The northern prong extends westward to Ishim, Tyumen and Sverdlovsk. Both prongs of the fork ultimately meet again in Moscow. There are

* Following page 10

KEY TO ANNOTATIONS

1. Holding yard.
2. Control tower.
3. Three-track by-pass yard.
4. Passenger station.
5. Water tank.
6. Highway viaduct.
7. Double railroad bridge, over the Irtysh River.
8. By-pass rail line for eastbound freight traffic.
9. Holding yard for freight and warehouse area.
10. Control tower and freight dispatch office.
11. Holding yard.
12. Control tower.
13. Control tower.
14. Freight warehouse and open storage area.
15. Passenger station.
16. Pedestrian walkways.
17. Passenger yard.
18. Two car repair sheds.
19. Car repair shed.
20. Control tower.
21. Car repair shed.
22. Water tank.
23. Two tanks.
24. Turning wye.
25. Coal storage area.
26. Steam and diesel locomotive repair shed.
27. Rail line from classification yard to passenger yard.
28. Signal bridge.
29. Classification yard.
30. Two transloading sheds.
31. Inclined hump-track.
32. Five storage tracks.
33. Three tracks.
34. Rail line serving local industrial in Omsk.
35. Holding yard.
36. Turning wye.
37. Electric locomotive repair shed.
38. Electric locomotive light-repair and maintenance shed.
39. Small coal-storage area.
40. Water tank.
41. Receiving yard for eastbound traffic.
42. Forwarding yard for westbound traffic.
43. Car-repair and maintenance shed.
44. Classification yard.
45. Control tower.
46. Receiving yard for westbound traffic.



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four complexes for a total effective trackage for storing cars of 340,000 feet, some 64 miles. At the time of the photography the effective yard trackage was occupied by 3,896 freight cars or the equivalent of about 70 average length trains, appoximately 48 percent of yard capacity. The static capacity, therefore, is sufficient for 8,300 cars or about 145 average trains.

Freight yards can be divided by function into the following types: holding, terminal, storage, receiving, forwarding, relay and classification. All types of yards are represented at Omsk.* It is estimated that during a time when maximum operations on the Trans-Siberian Railroad are desired, Omsk would be an extremely important point for the make-up and break-up of trains. For this reason it would be important to have substantial capacity at Omsk for the classification or make-up of trains to be forwarded eastbound over the Trans-Siberian Railroad, and for the break-up and reclassification of trains arriving at Omsk after travelling westbound over the Trans-Siberian Railroad.

The photography reveals that there are three separate classification yards at Omsk with a total of 65 tracks for the classification of cars into trains. The TCEG Report estimates that the classification operation required 8 hours. If this estimate is accepted for the purpose of illustration, each of these classification tracks could classify 3 trains daily or a total of 195 trains on the 65 classification tracks. They would have sufficient capacity, therefore,

* The yard functions with which this report are primarily concerned are classification and relay. The classification function consists of breaking-up trains and the sorting of cars from these trains or other sources into new trains. The relay function takes place at stations where it is not necessary to reclassify cars in a train. It normally consists of changing power and crews, inspecting the train and setting out cars found to be in bad order.

to support some 97 trains daily in and out of Omsk by way of the Trans-Siberian Railroad. The TCEG Report further estimates that not all trains need be classified at Omsk and states that some trains would only need to be relayed at this terminal. This function would require four hours, according to the TCEG Report. In addition to the tracks available for the classification function, there are 42 tracks that could be used for the relay function. Based on the utilization factor, mentioned above (four hours), these tracks would support 252 trains for relay purposes. The computations would place the total freight train support capability of the Omsk terminal at about 447 trains per day.

2. Tatarsk

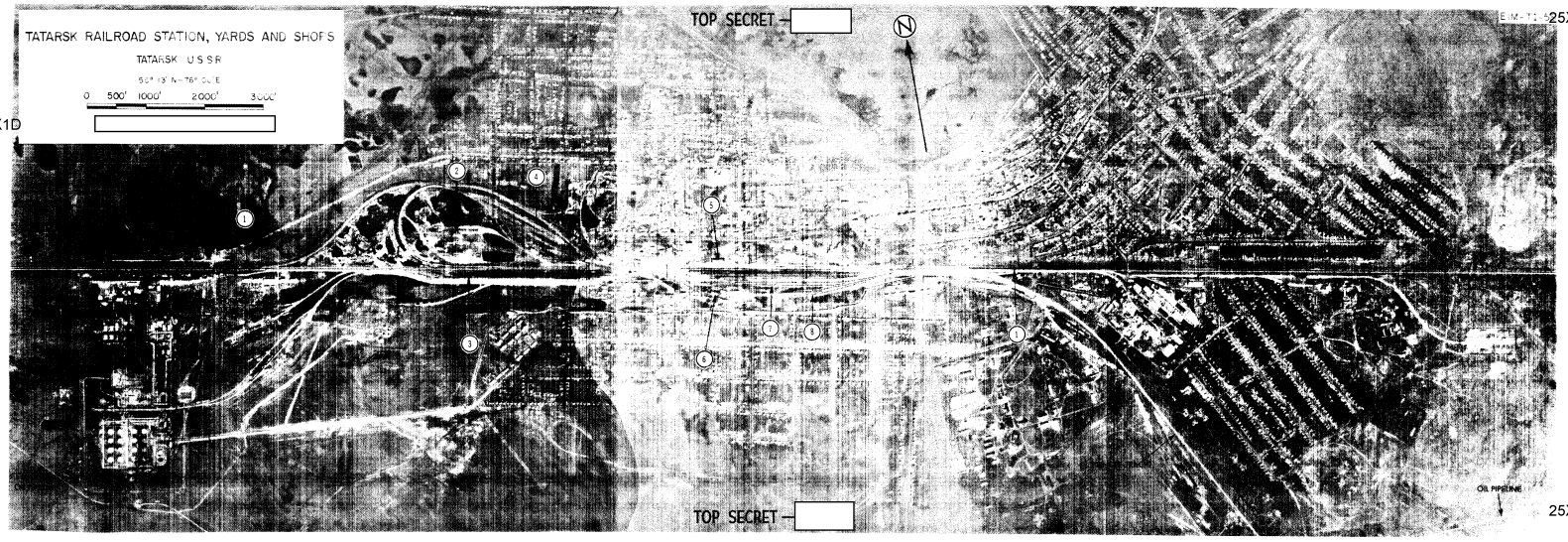
Tatarsk is located 168 kilometers east of Omsk and 356 kilometers west of Novosibirsk. From Tatarsk a single track rail line leads southeast to Kulunda on the South-Siberian Railroad, and to Semipalatinsk on the Turkestan-Siberian Railroad. Tatarsk is the only railroad installation of significant size between Omsk and Barabinsk although there are eight small way-stations between Omsk and Tatarsk and six between Tatarsk and Barabinsk.

Tatarsk has four yards (1) a 16 track receiving and forwarding yard, (2) a 19 track classification yard, (3) a nine track holding yard, and (4) a four track holding yard. (Figure 3)*. The yards associated with the through movement on the Trans-Siberian Railroad are estimated to be the receiving and forwarding yard, and the classification yard. The two holding yards containing a total of

* Following page 12

KEY TO ANNOTATIONS

1. Choke points.
2. Electric locomotive repair facilities.
3. Receiving/forwarding yard.
4. Holding yard.
5. Passenger station.
6. Railroad car repair yard and shops.
7. Classification yard.
8. Holding yard.



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13 tracks would be used primarily for local traffic to and from Tatarsk, and for traffic to and from the Kulunda branch line.

There is some doubt that each through train would have to be relayed at the way-station of Tatarsk under electric operation. However, assuming for the purposes of illustration, that this is the case, and that only two tracks are reserved for classification, then according to the photography, a minimum of 31 tracks would be available for relay purposes. Applying the same yard utilization factor for relay purposes contained in the TCEG Report these 31 tracks would support 186 through trains daily. The two tracks reserved for the classification function would support an additional six trains for a total of 192 trains per day.

3. Barabinsk

Barabinsk is located 325 kilometers east of Omsk and 304 kilometers west of Novosibirsk. Apart from Omsk, Tatarsk and Novosibirsk, Barabinsk is the only yard of any consequences, covered by photography, on the railroad line between Omsk and Novosibirsk. Between Tatarsk and Barabinsk there are six minor way-stations covered by photography. No photographic coverage exists on the line and yards over the 304 kilometer stretch between Barabinsk and Novosibirsk.

Barabinsk has five yards as follows: (1) a 15 track holding yard, (2) a nine track receiving and forwarding yard, (3) a 22 track classification yard, (4) a 15 track receiving and forwarding yard and (5) a three track holding yard. (Figure 4)*. A single track branch line leads from Barabinsk north six miles to Kuybyshev

* Following page 13

KEY TO ANNOTATIONS

1. Choke points.
2. Holding yard.
3. Railroad car repair yard and shops.
4. Receiving/forwarding yard.
5. Locomotive repair yard and shops.
6. Holding yard.
7. Passenger station.
8. Storage area.
9. Classification yard.
10. Open storage
11. Receiving/forwarding yard.

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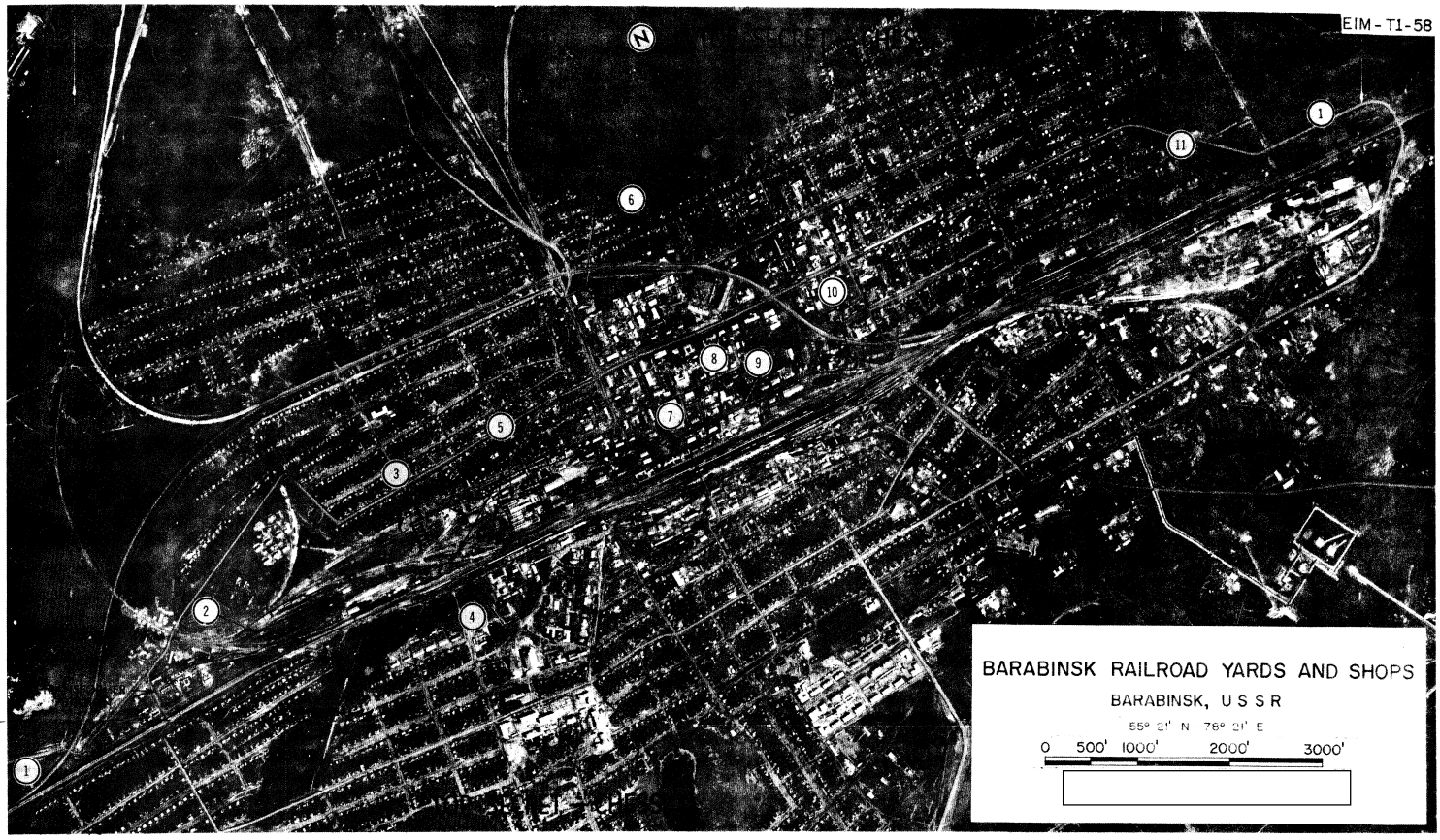

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(Kainsk Barabinskiy) to serve the large Kuybyshev Power Plant and other industry at the locality. It is estimated that the two holding yards would be associated primarily with local traffic for Barabinsk and traffic to and from the branch line. The yards primarily associated with the through movement of traffic on the Trans-Siberian Railroad would be then the two receiving and forwarding yards and the classification yard.

The magnitude of the yard capability at Barabinsk can be illustrated by applying the utilization factors for yard operation contained in the TCEG Report. Assuming further for the purposes of illustration that only half of the tracks in the receiving and forwarding yards and the classification yards are used for the relay of trains, there would then be available 23 tracks for relay purposes. This number of tracks would support 138 trains per day. Eleven tracks would remain for the classification function. These tracks would support 33 trains for a total of 171 trains per day. In addition, the holding yards have the capability of supporting 12 trains simultaneously.

4. Novosibirsk

Novosibirsk is a major railroad center on the Trans-Siberian Railroad. In addition, it is the northern terminus and junction with the Trans-Siberian Railroad of the Turkestan-Siberian Railroad which extends south from Novosibirsk to Barnaul, Semipalatinsk and Alma-Ata. A line also connects Novosibirsk with the Kuznetskiy coal basin to the southeast. The main track of the Trans-Siberian

Railroad from Omsk proceeds east at Novosibirsk across the Ob River and through a complex of freight and passenger yards. (Figure 5)*. A freight by-pass line departs from the Trans-Siberian main line a short distance west of Novosibirsk, and proceeds across the Ob River over a separate bridge south and east of the main line bridge, and leads into the large Inskaya classification yard south and east of Novosibirsk. The freight by-pass connects Inskaya with the main line of the Trans-Siberian Railroad at Sokur, 35 kilometers east of Novosibirsk.

There are four separate yard complexes for a total effective trackage for storing cars of 371,000 feet some 70 miles. At the time of the photography the effective yard trackage was occupied by about 4,400 freight cars or the equivalent of about 80 average length trains approximately 51 percent of yard capacity. The static capacity, therefore, is sufficient for about 8,800 cars or about 160 average trains.

The yard complexes at Novosibirsk, therefore, have the capability to support extremely high traffic density on the Trans-Siberian Railroad.

The Inskaya classification yard alone has a total of 43 classification tracks which according to the utilization factor contained in the TCEG Report would be capable of classifying 129 trains per day. In a situation under which the USSR would wish to obtain a maximum through movement on the Trans-Siberian Railroad, this yard could amply care for any number of trains that conceivably

* Following page 15

may need to be classified at Novosibirsk in order to obtain an efficient operation. In addition to Inskaya there are 11 tracks in the "Altaish" yards, 34 tracks at the "Central" yards and 14 tracks at the "Northeast" yards. These tracks could be used for relay purposes. Assuming for the purposes of illustration that this is the case then using the utilization factor for the relay of trains, 414 trains could be supported daily. Adding this number to the trains that can be classified at Inskaya one obtains a figure of 543 trains per day that could be supported by the yards at Novosibirsk.

D. Locomotive Servicing and Repair Facilities

1. General

The precise estimation of locomotive availability based on an inventory of locomotive servicing and repair facilities is beyond the scope of this paper. The preparation of such an estimate involves very careful study of the function of each facility in terms of steam, diesel and electric operation, coupled with the application of experience factors for the servicing and repair of each type of power. Locomotive servicing and repair facilities have been identified from the available photography sufficiently, however, to provide some concept of the magnitude of these facilities on the Trans-Siberian Railroad between Omsk and Barabinsk and at Novosibirsk.

2. Evidence

At Omsk three separate locomotive servicing and repair

facilities have been identified in buildings of the rectangular type. These shops have a total of 191,350 square feet of floor space. At Tatarsk, four separate rectangular buildings associated with locomotive servicing and repair provide 76,300 square feet of floor space. At Barabinsk a very large complex consisting of eleven rectangular buildings has a total of 186,500 square feet of floor space. At Novosibirsk there are nine separate rectangular buildings associated with locomotive servicing and repair providing 171,450 square feet of floor space. In addition, there is one conventional roundhouse with eight stalls of the type normally associated with steam locomotive servicing and repair at Novosibirsk.

3. Significance of the Size of Facilities

If, for the purpose of illustration, 2,500 square feet can be assumed to be a reasonable amount of working space for the servicing and repair of locomotives, the floor space in the various shops identified in the photography will provide working space for an extremely large number of locomotives as indicated in Table 1, below:

Table 1

Total Floor Space and Working Space for Servicing and Repair of Locomotives

Station	Total Floor Space (Square Feet)	Number of Work Spaces a/
Omsk	191,350	76
Tatarsk	76,300	30
Barabinsk	186,550	75
Novosibirsk	[redacted]	76 b/

25X1

a. Computed on the basis of 2,500 square feet per locomotive. USSR freight and passenger locomotives vary in length from about 60 to 90 feet.4/

b. Includes eight stalls in a round house.

No attempt has been made to estimate the number of serviceable locomotives that can be made available on a daily basis by the floor space and work spaces listed above. The amount of time a locomotive needs to occupy a work space depends on the complexity of the required repair work. Some spaces will be occupied for days and other spaces for only a matter of an hour or less. In most instances, the photography reveals that the storage tracks for repair shops are virtually empty indicating a low breakdown rate and more than adequate repair facilities.

III. Comparison of Estimates

A. Line Capability

1. Omsk-Barabinsk

The TCEG Report contains an estimate that the Omsk-Novosibirsk line which includes the section between Omsk and Barabinsk has a capability of 43 freight trains and two trains for railroad operation and maintenance for a total of 45 trains each way per day.

The 45 freight trains would average 2,088 net tons each, so that the traffic movement would be 93,960 tons each way per day. This capability estimate compares with 70 trains or 156,800 tons each way per day which can be estimated from analysis of the [redacted] 25X1D 25X1D [redacted] photography.

Several other estimates of train movement may be cited to confirm the validity of the estimate derived from photography. A trip report covering 98 kilometers of this line 25X1D on [redacted] presents a count of 17 freight trains moving east.[5] By application of the [redacted] formula, it 25X1A is possible to obtain an estimate of 68 trains moving eastbound daily or 152,320 tons. The Soviets have announced that in 1955 the freight density on the Omsk-Novosibirsk line amounted to 69,000,000 ton-kilometers meaning that 69,000,000 tons were carried between Omsk and Novosibirsk in 1955.[6] About 48,700,000 tons moved westbound from Novosibirsk to Omsk in 1955,[7] and therefore 20,300,000 metric tons moved eastbound from Omsk to Novosibirsk. Based on an average net load of 2,240 tons per train, the daily average train movement would have been 60 trains and 134,400 tons westbound and 25 trains and 56,000 tons eastbound. Because of the imbalance in the movement of traffic there would have been in this year a daily average of approximately 35 trains of empty cars moving eastbound. Some trains of empty cars would also have moved westbound in addition to the 60 loaded trains in order to return certain specialized cars such as tank cars for

loading. The Soviets have announced that in 1956, 74,000,000 tons were carried between Omsk and Novosibirsk.[8/] Based on the same type of computation, the 1956 movement would have been an average of 64 loaded trains and 143,360 tons westbound per day.

These estimates are compared in Table 2 below. The weight of the evidence indicates a train and traffic movement more nearly in the magnitude of the estimate derived from analysis of the photography than the estimate contained in the TCEG Report.

Table 2

Comparison of Train and Tonnage Estimates Omsk-Barabinsk

	TCEG Estimate	[redacted] Photography Estimate	1957 Trip Report Estimate	1956 Freight Traffic Estimate	1955 Freight Traffic Estimate
Number of Trains per Day (Freight)					
Eastbound	45	80	68	64	60
Westbound	45	60	--	64	60
Total Trains	90	140	136	128	120
Average Trains Each Way per Day	45 a/	70 b/	68 c/	64 d/	60 e/
Percent of TCEG Report Estimate	100	155	151	144	134
Tons Each Way per Day	93,960 f/	156,800 g/	152,320 g/	143,360 g/	134,400 g/
Percent of TCEG Report Estimate	100	167	163	154	144

a. Includes two trains for railroad operation (including fuel) and maintenance.
b. Estimate based on method described in text.
c. Based on application of [redacted] formula to eastbound traffic observed for 98 kilometers of the Omsk-Novosibirsk railroad. Average speed of 25 kilometers per hour, assumed. 25X1A
d. Based on announced traffic density of 74 million tons on Omsk-Novosibirsk railroad line for 1956. 9/ Assumes same ratio of westbound to eastbound traffic which existed in 1955. Assumes average net load of 2,240 tons per train. Number of westbound trains based on traffic movement and does not include an estimate for empty car movement.
e. 10/ 11/ Number of westbound trains based entirely on loaded train movement of 2,240 net tons per train. No allowances has been made for return westbound of tank cars and other specialized types. Eastbound train and car movement assumed to equal at least loaded westbound movement.
f. Forty-five trains at 2,088 tons per train, the average net load per train estimated in the TCEG Report.
g. Number of trains times 2,240 tons per train (fifty-six cars at 40 tons per car).

2. Novosibirsk-Bolotnoye

The TCEG Report contains an estimate that the Novosibirsk-Achinsk line which includes the section between Novosibirsk and Bolotnoye has a capacity of 32 freight trains and two trains for railroad operation and maintenance for a total of 34 trains each way per day. The 34 trains would average 1,116 net tons each, so that traffic movement would be 37,971 tons each way per day. This capability estimate compares with 38 to 68 trains or 71,440 to 127,840 tons each way per day which can be estimated from analysis of the [redacted] photography. 25X1D These estimates are compared in Table 3, below. The A-Estimate represents the lower end of the range of the estimate made from the photography, and the B-Estimate the upper end of the range.

It is interesting to compare these estimates with a 1953 estimate, also in Table 3, of the westbound traffic movement from Yurga (a few miles east of Bolotnoye) to Novosibirsk, prepared by ORR.[12/] This estimate shows that 58,600 tons moved in an average day from Yurga to Novosibirsk. If the average net tons per train estimated from the [redacted] photography is used, an average of 31 trains daily is computed for this westbound movement. 25X1D If the average net tons per train for this section of line taken from the TCEG Report is used, an average of 53 trains is computed for this movement of traffic.

Table 3

Comparison of Train and Tonnage Estimate

Novosibirsk - Bolotnoye

25X1D

	TCEG Estimate	[redacted] Photography A-Estimate	B-Estimate	1953 Traffic Estimate C-Estimate	D-Estimate
Number of Freight Trains per Day					
Eastbound	34	40	84	15	53
Westbound	34	36	52	31	53
Total Trains	68	76	136	62	106
Average Trains Each Way per Day	34 a/	38 b/	68 c/	31 d/	53 e/
Percent of TCEG Report Estimate	100	111	200	91	156
Tons Each Way per Day	37,971 f/	71,440 g/	127,840 g/	58,600 h/	58,600 h/
Percent of TCEG Report Estimate	100	188	336	155	155

a. Includes two trains for railroad operation (including fuel) and maintenance.
b. Estimate based on application of [redacted] formula to traffic observed in the photography and use of an average speed of 11.7 kilometers per hour eastbound and 19.6 kilometers per hour westbound. 25X1A
c. Estimate based on application of [redacted] formula to traffic observed in the photography and use of an average speed of 25 kilometers per hour as explained in the text. 25X1A
d. Estimate derived from westbound traffic stated in 1953 traffic study 13/ and use of an average net train load of 1,880 tons.
e. Estimate as in d/, above, but with use of an average net train load of 1,116 tons taken from the TCEG Report.
f. Number of trains times 1,116 net tons per train.
g. Number of trains times 1,880 net tons per train.
h. 14/

B. Railroad Yards

The TCEG Report contains estimates of the number and function of tracks which are considerably below the estimates of yard capacity in terms of trains per day that it is possible to estimate from the [redacted] photography. 25X1D Even when the rather low yard utilization factors contained in the TCEG Report are used, for support of trains daily, estimates based on the inventory of tracks observed in the photography, are over one and a half to three and a half times greater than the estimates contained in the TCEG Report. The estimates of the yards at Tatarsk and Barabinsk limit the capability of the railroad line according to the TCEG Report. The photography shows a capability about double the capability for the yards at these places estimated in the TCEG Report. Estimates for all yards are compared in Table 4.

C. Locomotive Servicing and Repair Facilities

The estimate contained in the TCEG Report regarding the capability of locomotive servicing and repair facilities is for steam locomotive operations, and therefore is not currently applicable to the Omsk-Novosibirsk Railroad where operations have been carried on with electric traction since 1955. The TCEG Report is silent on the capability of locomotive servicing and repair facilities for electric operations, but it is nevertheless interesting to compare the inventory of repair work spaces contained in the TCEG Report with the inventory it is possible to

Comparison of Estimated Capability of Railroad Yards

Place	TCEG Report Estimate	Estimate from Photography
OMSK		
Number of Tracks	30	142
Number of Tracks Used for Classification	18	65
Number of Trains per Day	54	195
Number of Tracks Used for Relay	12	42
Number of Trains per Day	72	252
Total Trains per Day	126	447 a/
Percent of TCEG Report Estimate	100	350
TATARSK		
Number of Tracks	16	48
Number of Tracks Used for Classification	2	2
Number of Trains per Day	6	6
Number of Tracks Used for Relay	14	31
Number of Trains per Day	84	186
Total Trains per Day	90	192 b/
Percent of TCEG Report Estimate	100	213
BARABINSK		
Number of Tracks	16	64
Number of Tracks Used for Classification	--	11
Number of Trains per Day	--	33
Number of Tracks Used for Relay	16	23
Number of Trains per Day	96	138
Total Trains per Day	96	171 c/
Percent of TCEG Report Estimate	100	190
NOVOSIBIRSK		
Number of Tracks	75	151
Number of Tracks Used for Classification	40	43
Number of Trains per Day	120	129
Number of Tracks Used for Relay	35	69
Number of Trains per Day	210	414
Total Trains per Day	330	543 d/
Percent of TCEG Report Estimate	100	165

a. Computed on basis that all except 35 of available tracks would be used for classification or relay functions.

b. Computed on basis that only two of the classification tracks would be used for that function and that two tracks in the receiving and forwarding yard would be used for the classification function leaving 31 tracks for relay or through train movement. In addition, 13 tracks would be available for car storage.

c. Computed on basis that half of tracks in the classification, receiving and forwarding yards would be reserved for the classification function. Twenty-three tracks would then be available for the relay function. In addition, the holding yards would have the capability to support 12 trains simultaneously.

d. Computed on basis that all tracks except those in the Inskaya yard would be used for relay purposes.

25X1D estimate from [redacted] photography. Table 5 presents a comparison of these estimates and shows that the photography indicates two to five times the number of repair spaces estimated in the TCEG Report.

Table 5

Comparison of Estimated Number of Work Spaces for Locomotives

Place	TCEG Report	Estimate from Photography	Photography in percent of TCEG Report
Omsk	38	76	200
Tatarsk	6	30	500
Barabinsk	22	75	340
Novosibirsk	32	76	238

4. Significance of Comparative Estimates

Interpretation and analysis of the [redacted] 25X1D photography indicates train and traffic movements considerably in excess of the capability estimated for the Omsk-Novosibirsk and Novosibirsk-Bolotnoye railroad lines in the TCEG Report. The photography indicates a traffic movement more comparable to the traffic density announced by the USSR than to the intelligence capability estimate. Supporting facilities (yards and repair shops) are also in excess of the estimated inventory of these facilities contained in the TCEG Report. It is significant, moreover, that even though the traffic indicated by the photography is of high density, the freight car occupancy of the yards is relatively low in terms of the maximum normally considered possible for efficient

operations, and storage tracks for repair shops are virtually empty indicating excess capacity in these traffic supporting facilities. It appears, therefore, that the maximum sustained capability of the Omsk-Novosibirsk and Novosibirsk-Bolotnoye railroad lines must be significantly in excess of the traffic in terms of trains and tonnage per day estimated from the photography, which in turn is substantially higher than the maximum capability estimate of the TCEG Report.

The great discrepancy estimated here casts further doubt on the estimate contained in the TCEG Report for the through capability (Omsk-Vladivostok) of the Trans-Siberian Railroad which is only 27,000 tons per day or the equivalent of only about 12 trains of the type observed to be in operation between Omsk and Barabinsk. Photography has recently been obtained on the eastern end of the Trans-Siberian Railroad for approximately 715 kilometers between Svobodnyy and Khabarovsk. When this additional photography has been interpreted and analyzed, it is possible that the magnitude of operations and plant observed will force the entire intelligence community to revise upward its estimate of through capability of the Trans-Siberian Railroad.

APPENDIX A

Source References

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12. CIA. CIA/RR 72, The Volume and Character of Traffic on the Trans-Siberian Railroad in 1953, 9 Nov. 56, Figure 3. S.

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